UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

September 9, 2005

Reply To
Attn Of: OEA-095

Jan Newton, Co-Chair
Hood Canal Dissolved Oxygen Program
University of Washington
Applied Physics Lab
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Seattle, WA 98195

Dan Hannafious, Co-Chair
Hood Canal Dissolved Oxygen Program
Hood Canal Salmon Enhancement Group
22871 N.E. State Route 3
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Dear Ms. Newton and Mr. Hannafious,

EPA appreciates the opportunity to review the draft Quality Assurance Project Plan (QAPP) for the Integrated Assessment and Modeling (IAM) Study by the Hood Canal Dissolved Oxygen Program (HCDOP). Because water quality in Hood Canal is a major concern of EPA Region 10, we have included Hood Canal as a priority area for action. In our oversight capacity for the Total Maximum Daily Load (TMDL) program of the state of Washington, we are hopeful that the IAM study will provide high quality scientific information from which to build a TMDL analysis.

The high level of community interest in the dissolved oxygen problem is manifested in an impressive collection of governmental and citizen groups involved in this project. The HCDOP can serve a critical function of helping to plan and coordinate this work so that resources are spent wisely and efficiently. While HCDOP is doing an excellent job of organizing regular meetings of participants and building website content, a written plan for the project is needed. EPA strongly supports the drafting of this QAPP.

We have practical concerns about the modeling portion of the QAPP. As noted above, a primary EPA interest is the support of TMDL development. The Department of Ecology (Ecology) will need to use a model to make predictions of the response of the canal to changes in the inputs of oxygen-demanding substances. We have two concerns with the modeling plan. First, it appears that the water quality component of the modeling will require development of new model software instead of using available model software that can provide similar

predictions. Second, the computer resource requirements of the selected model programs may exceed our agencies' computer resources.

The water quality components of the two HCDOP models appear to be in the software development stage at present. EPA and Ecology generally use established model software for TMDL development. Examples of more commonly used model software include CE-QUAL-W2, QUAL2E, and EFDC-WASP. These programs have been documented, peer-reviewed, and widely tested in a variety of environments. While we are always open to the use of new programs that advance the science, we believe that it is most efficient to use existing modeling programs when possible. If an improved formulation for a particular process is needed in the existing model framework, one can make minor code enhancements to the framework and peer review only the change in the software, thus saving time and resources.

Regarding computer resources, the agencies are currently organized to conduct our assessments using standard PC workstations. Therefore, processing requirements and model run times are a central criterion for our model selection, and we generally do not select models that cannot be run on a standard PC. It is our understanding that the proposed model frameworks for HCDOP may require higher performance computing systems that are not available to Ecology.

Ecology's Environmental Assessment Program has a capable cadre of engineers and scientists that develop and apply water quality models across the state, and EPA believes HCDOP should take full advantage of the state's analytical resources. We are concerned that the issues with HCDOP's modeling plan may necessitate a separate effort by Ecology to develop a model for its TMDL work. With two models currently under development, we note that the document advocates an "ensemble" of models of Hood Canal. Rather than re-consider the selection of the two model systems under development by HCDOP, EPA would support an effort by Ecology to develop a third model in the ensemble using currently available software. Using the data collected to date, we believe a useful water quality model can be developed in a matter of months once resources are directed to the task. If we can accelerate the model development timeline, it would allow us to estimate the sensitivity of dissolved oxygen levels to various boundary conditions and adjust future monitoring toward areas of greatest importance.

We have attached more detailed, page-by-page comments on the QAPP for your consideration. Please contact Ben Cope of our Office of Environmental Assessment with any questions. Thank you for your efforts to improve our understanding of the water quality dynamics of Hood Canal.

Sincerely,

Christine Psyk, Manager
Watershed Unit
Office of Water

cc: Will Kendra, Washington Department of Ecology
Melissa Gildersleeve, Washington Department of Ecology
Laurie Mann, EPA Region 10

Attachment

The following are EPA's detailed comments on the draft Quality Assurance Project Plan for the Hood Canal Dissolved Oxygen Program, Integrated Assessment and Modeling Study, Year 1 Activities (August 2005).

Page	Comment
3	We suggest adding the topic "Conceptual Model for Hood Canal Dissolved Oxygen" early in the document. This section should include some simple diagrams and schematics that identify potential stressors on dissolved oxygen that will be examined in the study.
6	The list of potential factors causing an increase in hypoxia could be clarified. Again this should be an outgrowth of description of the conceptual model. We would recommend an outline of processes something like the following: *Estuarine Processes* *Boundary hydrodynamics and mass inputs from wider Puget Sound* *Hood Canal density and circulation* *Tributary Inflows* *Flow* *Nutrients and biochemical oxygen demand* *Dissolved Oxygen* *Shoreline Inflows* *Groundwater* *Flow* *Nutrients and biochemical oxygen demand* *Point sources* *Flow* *Nutrients and biochemical oxygen demand* *Meteorological Processes* *Critical conditions – temperature and wind*
8	The language regarding the linkage of this project to TMDL development should be clarified and strengthened. Is it the intention of HCDOP to provide technical tools that will be useful for Ecology's development of a TMDL? Or would TMDL support only be a potential by-product, which is implied in the current language (e.g., "These programs may result in a TMDL…"). This plan does not need to address TMDL targets, which will be Ecology's task, so we suggest striking the last sentence.

8	The "Background" discussion is another partial view into the conceptual model. This can be folded into that new section of the document. Note that nutrient inputs from exchange with Puget Sound boundary waters is not mentioned as a nutrient source.
10	Minor edit to last sentence on page. "Nitrogen is the primary **nutrient** parameter of concern."
12-13	Nitrogen loading estimates are a fundamentally different type of "data" than the monitoring data also described in this section. We suggest separating monitoring data from nitrogen loading assessments into separate report sections. Perhaps loading estimates should be moved to the "Background" section.
15	The extent of HCDOP's role in the overall monitoring effort is unclear. What is the extent of HCDOP's role to provide better monitoring of the canal and adjacent areas? Is HCDOP funding the majority of monitoring occurring at present, or is it filling in gaps in the current monitoring? Has there been any planning of the monitoring to date, or has the rough consistency of monitored parameters been a by-product of informal discussions among interested parties? Is the funding and monitoring by the various organizations expected to continue for a number of years?
16	HCDOP's congressional funding and charge should be described.
16	We are unclear as to what Figure 4 is conveying. It is titled a "fiscal" organizational chart. USGS should therefore not be under HCDOP, since it is funded separately according to the preceding paragraph. Also, the figure suggests that funding could potentially flow from HCDOP to UW-APL to HCSEG to the state of Washington. Is that correct?
21	Some general comments on modeling approach section: 1. See concerns in cover letter to these comments 2. Computer system requirements to run each model should be described. 3. Plans to conduct any peer review should be described. 4. Ecology's modeling plans should be added if appropriate.
21	We suggest more clarity on the purpose of various models. We can envision two specific purposes of the terrestrial model. 1) to estimate the effects of land use changes on tributary water quality, and 2) to fill gaps in the tributary monitoring record to improve the estuary model development.
23	Suggest "The Princeton Ocean Model will simulate the hydrodynamics of the entire Puget Sound *in order to provide boundary conditions (mass and energy inputs) for the Hood Canal model***."**

27	Note that water temperature models require estimates of pressure and cloud cover in addition to parameters discussed in first paragraph.
36	General comment on water quality monitoring: While most plans include complete nutrient analyses, biochemical oxygen demand (BOD) is not included. This will require modelers to assume concentrations for BOD at model boundaries and advective inputs to the canal. Has this data gap been considered by HCDOP and others?
39	Table 9. No Ammonia analysis.
40	Table 10. What is "TDN"?
41	Tables 11 and 12. No in-situ monitoring. This should be identified as a data gap.
48	Add section on Weather Data. Should include National Weather Service locations (and parameters) and other local sources of data like marine buoys.
49	Is there any information on nitrate and ammonia in the Alderbrook discharge? This should be noted in the report.
64	This discussion does not answer the fundamental question of a typical data user: How can one gain access to the electronic data generated under this project? The cited nodes offer graphical data presentations but not download capability for electronic data. Does HCDOP envision data download from these sites in the future? Is there a project plan to get from here to there under development? In the meantime, the document should probably state the obvious for Year 1: the data is currently distributed among the organizations collecting it, and analysts must contact data owners to obtain electronic data. Also, it is unclear how data collected by Dept. of Ecology, USGS, and National Weather Service are included in these nodes. Ecology and USGS sites support downloading of data. National Weather Service requires a subscription.
General	There are a number of gaps and inconsistencies in the ongoing monitoring. We recommend adding a chapter on this issue and include recommendations to resolve each gap/inconsistency. For example, if one entity collects chlorophyll-a samples at the surface and 10 meters depth and another entity collects chlorophyll-a samples at 5 and 10 meters, HCDOP could recommend that future sampling occur at consistent, specified depths.